UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/500,264	12/08/2004	Andrea Mahn	4121-168	9836

23448 7590 12/06/2007

INTELLECTUAL PROPERTY / TECHNOLOGY LAW
PO BOX 14329
RESEARCH TRIANGLE PARK, NC 27709

EXAMINER	
WORLEY, CATHY KINGDON	
ART UNIT	**PAPER NUMBER**
1638	

MAIL DATE	DELIVERY MODE
12/06/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/500,264	MAHN ET AL.	
	Examiner	Art Unit	
	Cathy K. Worley	1638	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *08 August 2007*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *20-30* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *20-30* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

1. The text of those sections of Title 35, U.S.Code not included in this action can be found in a prior Office action.

Status of Claims

2. Claims 20-30 are pending and are examined herein.

Objections and Rejections that are Withdrawn

3. The rejection of claims 20-30 under 35 USC 112, second paragraph, is withdrawn in light of the Applicant's amendment of the claims.

Claim Objections

4. Claims 24 and 25 are objected to because of the following informalities: they are technically incorrect. The recitation of "the plant comprises" followed by a list of plants is technically incorrect because a plant can't be wheat, barley, rice, corn, etc. all at once. The Applicant is advised to replace "comprises" with - - is - - in both claims, and in claims 24, replace "and" with - - or - - . Appropriate correction is requested.

Claim Rejections - 35 USC § 112

5. Claims 20-26 remain rejected and claims 27-30 are rejected under 35 U.S.C. 112, first paragraph, for lack of scope of enablement. After further consideration, this rejection is modified from the previous rejection mailed on April 10, 2007. The Applicant's arguments in the response filed on Aug. 8, 2007, have been fully considered, but were not found to be persuasive.

The specification, while being enabling for a method for increasing the concentration of a transgene-coded protein expressed under the control of the nos promoter or 35S promoter in a potato plant comprising transforming a potato plant with an antisense construct comprising a potato cDNA for an ATP/ADP transporter operably linked in antisense orientation to a promoter that functions in potato plants, does not reasonably provide enablement for any other method of increasing the content of a transgene-coded protein in any other species of plant or a transgene-coded protein expressed under the control of any other promoter. The specification does not enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to practice the invention commensurate in scope with these claims.

The claimed invention is not supported by an enabling disclosure taking into account the *Wands* factors. *In re Wands*, 858/F.2d 731, 8 USPQ2d 1400 (Fed. Cir. 1988). *In re Wands* lists a number of factors for determining whether or not undue experimentation would be required by one skilled in the art to make and/or use the

invention. These factors are: the quantity of experimentation necessary, the amount of direction or guidance presented, the presence or absence of working examples of the invention, the nature of the invention, the state of the prior art, the relative skill of those in the art, the predictability or unpredictability of the art, and the breadth of the claim.

The claims are broadly drawn to a method of increasing the content of one or more transgene-coded proteins or peptides in any type of plant by utilizing antisense inhibition of the endogenous plastidiary ATP/ADP transporter gene and utilizing a transgene that comprises any promoter.

The nature of the invention is a molecular biological approach utilizing antisense to suppress the expression of the endogenous ATP/ADP transporter in the chloroplasts of potatoes. This suppression results in an increase in accumulation of a transgene-encoded protein when the transgene coding sequence is operably linked to the 35S or nos promoter.

The prior art teaches that antisense constructs have been successful in suppressing the expression of endogenous ATP/ADP transporters in transgenic potatoes and tobacco (see Tjaden et al. (1998) The Plant Journal, Vol. 16, pp. 531-540 and Hausler et al. (1998) Planta, Vol. 204, pp. 366-376).

The Applicants teach how to make an antisense construct comprising a cDNA from potato and how to transform a potato plant with this construct and provides this as a working example (see pages 14-15).

However, the instant specification does not provide any further guidance for any host plant other than a potato plant.

There is a high degree of unpredictability regarding which species of plants will produce the desired result (an increase in transgene-encoded protein or polypeptide) in response to antisense inhibition of the endogenous plastidiary ATP/ADP transporters. For example, Reiser et al. teach that Arabidopsis plants that are either knocked out for the endogenous transporter or, alternatively, have RNAi inhibition of the transporter had a reduced protein content rather than an increase in protein content (see Reiser et al. (2004) Plant Phys. Vol. 136, pp. 3525-3536, especially page 3532, Figure 11, panel C). Reiser et al teach that seed protein levels are decreased in seeds of these plants (see page 3531, left column, second paragraph). Thus, there does not appear to be an increase in proteins in a plant lacking ATP/ADP transporters compared to the amount of protein in a wild-type plant. This demonstrates the unpredictability of inhibiting expression of a plastidiary ATP/ADP transporter in different species of plants to increase the amount of protein or peptide made in the plant.

The Applicant argues that the showing of a decrease in total protein by Reiser et al does not necessarily mean there would be a decrease in a transgene-coded protein (see pages 5-8 of the response). The Examiner agrees that these data are measuring different things, however, the amount of total protein is usually indicative of the amount of transgene encoded protein, unless the transgene utilizes

a promoter that is induced or developmentally regulated in such a way that the transgene is expressed preferentially over other proteins. Therefore, it is possible that the promoters utilized in the instant invention (nos promoter and 35S promoter (see second paragraph on page 15 and first paragraph on page 16) have newly discovered regulation in response to antisense suppression of the plastidiary ATP/ADP transporter. If this is the case, then the critical element of the invention is the use of one of these promoters, and it would be necessary to determine if this newly found regulation is funcational in other plant species.

However, the other possibility is that there is a general change in physiology, especially since a potato utilizes a large amount of ATP in its vegetable storage tissues (see Applicant's discussion of the physiology on page 3 of the specification). If this is the case, then the plant is shifting its energy from making starch in the potato to making protein, and this would demonstrate a change in total protein content in the potato. The Applicant argues that the potatoes of the working example were subjected to a proteinchemical analysis and the content of different foreign proteins and whole protein was determined, and it was determined that there was a marked increase in the foreign protein content (see page 6 of the response). This is not persuasive, however, because the data regarding whole protein content was not provided.

The Applicant is invited to provide data in the form of a declaration showing that the potatoes of the instant invention has decreased total protein content

(similar to the Arabidopsis plants taught by Reiser et al), and if such data can be provided, then this portion of the rejection will be reconsidered and could be withdrawn. However, the only promoters that would be enabled would be the 35S and nos promoters.

If, however, the potatoes have increased total protein, then the enablement would be limited to potatoes, but all promoters could be enabled.

Given the lack of guidance in the instant specification, undue trial and error experimentation would be required for one of skill in the art to determine which species of plants will produce an increased level of protein when the expression of the plastidiary ATP/ADP transporter is inhibited by antisense suppression, and to determine which promoters can be utilized to drive the expression of the encoded transgene to result in an increase in expression.

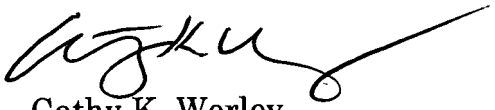
Therefore, given the breadth of the claims; the lack of guidance and working examples; the unpredictability in the art; and the state-of-the-art as discussed above, undue experimentation would be required to practice the method of the claimed invention, and therefore, the invention is not enabled throughout the broad scope of the claims.

6. No claim is allowed.

7. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Cathy K. Worley whose telephone number is (571) 272-8784. The examiner can normally be reached on M-F 8:30 - 5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Anne Marie Grunberg, can be reached on (571) 272-0975. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Cathy K. Worley
Patent Examiner
Art Unit 1638

CKW